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EXAMINER	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte RAINER PIETIG

Appeal 2009-009143
Application 10/538,580
Technology Center 2800

Before JOSEPH F. RUGGIERO, ROBERT E. NAPPI, and
BRADLEY W. BAUMEISTER, *Administrative Patent Judges*.

BAUMEISTER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Summary

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1 and 4. These claims stand rejected under 35 U.S.C. § 103(a) as obvious over Marusawa (JP 409294006 A; published Nov. 11, 1997) in view of Maruhashi (US 2001/0028280 A1; published Oct. 11, 2001) and Tanaka (US 6,710,671 B1; issued Mar. 23, 2004). Claims 2, 3, and 5 have been indicated as containing allowable subject matter.

We reverse.

Background

Appellant describes the invention as follows:

> The invention relates to a non-reciprocal circuit element having a plurality of strip conductor elements insulated electrically from one another, which conductor elements are embedded in a multilayer core of ferrimagnetic material and are arranged in superposed conductor planes in such a way that the conductor elements cross over one another in at least one crossover area

(Spec. 1:1-5).

Such non-reciprocal circuit elements were generally known (Spec. 1-2). The primary difference between the prior art and the present invention is that soft magnetic material, such as yttrium iron garnet (YIG), was conventionally used for the multilayer core, whereas the present invention employs a hard magnetic material, such as barium hexaferrite (Spec. 2-3).

Independent claim 1 is representative,[1] reading as follows:

> 1. A non-reciprocal circuit element having a plurality of strip conductor elements (2) insulated electrically from one another, which conductor elements are embedded in a multilayer core (3) of ferrimagnetic material and are arranged in superposed conductor planes in such a way that the conductor elements (2) cross over one another in at least one crossover area (4, 5), characterized in that the core (3) comprises, at least in the area (4, 5) where the conductor elements (2) cross over one another, hard magnetic material, which is permanently magnetized in a spatial direction perpendicular to the conductor planes.

The Examiner finds that Marusawa discloses a non-reciprocal circuit element possessing substantially all of the elements recited in claim 1 except for the material of the core being composed of a hard magnetic material (Ans. 4). Rather, Marusawa discloses an example of a prior-art circuit element wherein the core material is composed of soft magnetic material (*see* App. Br. 7). The Examiner concludes, though, that it would have been obvious to substitute layers of hard magnetic material for Marusawa's soft magnetic material for the following reasons: (1) Maruhashi provides motivation to substitute a hard magnetic material for a soft magnetic material within circulators and isolators (Ans. 4, citing Maruhashi ¶ [0056]); and (2) Tanaka provides evidence that one of ordinary skill in the art would be reasonably able to construct a plurality of layers of sinterable thin hard ferrite material (Ans. 6, citing Tanaka Fig. 6B and col. 7, ll. 31-44).

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[1] Appellant argues claims 1 and 4 together as a group. *See* App. Br. 8 (arguing the patentability of claim 4 solely based on the claim's dependence from claim 1). Accordingly, we select independent claim 1 as representative. *See* 37 C.F.R. § 41.37(c)(1)(vii).

Appellant argues, "there is no teaching of record that a suitable technique for forming a sinterable foil of hard magnetic material was known" (App. Br. 8). More specifically:

> neither [Marusawa nor Maruhashi] teaches or suggests a specific hard magnetic material suitable for use in the fabrication technique of Marusawa in which the magnetic material would be applied as a sinterable foil in the course of fabrication in like manner as layers of other materials. There is no evidence that such a hard magnetic material, capable of being worked in this manner, would have been known to or readily ascertainable by one of ordinary skill in the art.

(App. Br. 7).

Appellant further contends that Tanaka supports Appellant's position that the combination of Marusawa and Maruhashi would not have been obvious because "not only does Tanaka make absolutely no reference to sintering or construction techniques associated with sintering; but Tanaka further teaches the use of a *separate permanent magnet layer* apart from a ferrite layer" (Reply Br. 2).

ISSUE

Does the cited art of record support the Examiner's finding that one of ordinary skill in the art would have been aware of a suitable technique for producing, specifically of a hard magnetic material, multilayer magnetic cores in which a plurality of superposed strip conductor elements are embedded?

ANALYSIS

We first address the Examiner's assertion that "the present claims are device/product claims and thus the method of manufacturing the device is

not particularly relevant to the rejections" (Ans. 6). We agree with the Examiner that claim 1 is a product claim. We further find that claim 1 does not expressly or implicitly require that the hard magnetic material necessarily be formed of "'green' foils" or that the resultant hard magnetic material be formed by a sintering process as is disclosed in the Specification (*e.g.*, Spec. 4). That is, we see no reason that would preclude claim 1 from reading on a hypothetical structure where an adhesive is used to attach plural layers of hard magnetic material. Nonetheless, claim 1 does still require that the conductor elements be embedded in the multilayer core of hard magnetic material. Restated, the layers of hard magnetic material individually sandwich a plurality of superposed conductor elements.

The portions of Tanaka upon which the Examiner relies for support, Figure 6B and column 7, lines 31-44 (*id.*), do not disclose that the conductors are embedded within a multilayer core of hard magnetic material. Although Tanaka does disclose that a permanent-magnet substrate 4 is laminated on a ferrite substrate 3, the conductors 5-7 are not embedded within either of these layers. Rather, "an insulator 12 is interposed between the central conductors 5 to 7 at the intersection of the central conductors 5 to 7 in the center" (Tanaka col. 4, ll. 40-45). Tanaka does not disclose that the insulator 12 may be composed of a hard magnetic material though (*see* col. 4, ll. 45-47, merely stating that the insulator 12 may be composed of "a ceramic, glass, a metal, an oxide, an insulating resin sheet, or an insulating adhesive").

For the foregoing reasons, Appellant has persuaded us that the Examiner has not established a prima facie showing of obviousness with

respect to representative claim 1. Accordingly, we will not sustain the Examiner's rejection of that claim or of claim 4, which depends therefrom.

DECISION

The Examiner's decision rejecting claims 1 and 4 is reversed.

REVERSED

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